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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/646,680	11/04/2000	Hideo Yamanaka	SON-1782/KOI	5089

7590 10/23/2002

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EXAMINER

FULLER, ERIC B

ART UNIT	PAPER NUMBER
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1762

DATE MAILED: 10/23/2002

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/646,680

Applicant(s)

YAMANAKA ET AL.

Examiner

Eric B Fuller

Art Unit

1762

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 July 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-45 is/are pending in the application.
- 4a) Of the above claim(s) 3-7, 10-13, 15, 18, 19 and 22-45 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 2, 8, 9, 14, 16, 17, 20 and 21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

Applicant's election with traverse of Group I in Paper No. 9 is acknowledged. The traversal is on the grounds that because the apparatus in independent claim 23 is specifically designed for carrying out the process of independent claim 1, a shared special technical feature must be present. Applicant also argues that the presence of species must also indicate that a shared special technical feature is present. This is not found persuasive.

Examiner concedes that the method and apparatus share technical features with each other. However, these technical features are not patentable, as these features have been made obvious by the prior, and therefore these shared technical features do not qualify as *special* technical features.

The applicant, in paper 6, made the provisional election to species 1. The last Office Action examined the claims that qualify as Group I, species 1. As the generic claims are not patentably distinct from the prior art and the corresponding species do not share technical features with the other species, outside the dependency to the generic claims, it has been shown that the species lack a shared *special* technical feature with each other.

The requirement is still deemed proper and is therefore made FINAL.

Claim Rejections - 35 USC § 103

Art Unit: 1762

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 2, 16, 17, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyoshi (US 6,225,241 B1) in view of Foster et al. (US 4,668,365).

Miyoshi teaches a process where silane and ammonia gas are flowed over a heated catalyzer. This causes the reactive gases to form a SiN film on a substrate (column 4, lines 16-27). This reference fails to teach the use of an electric field to provide kinetic energy to the reactive gases, such as a DC bias applied to the substrate.

However, it is known in the art that as silane is passed over a catalyzer, radical hydrogen ions are produced. Evidence that this is known is provided in the applicant's disclosure on page 3, second paragraph. Additionally, Foster teaches that it is a "well-known fact that low DC bias and the resulting relatively low-energy ion bombardment result in low substrate and film defect densities" (column 8, lines 32-34). Although the gas in Foster is plasma, it is realized that the DC bias would cause the hydrogen ions of Miyoshi to undergo ion-bombardment of the substrate. Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize a DC bias in the process taught by Miyoshi. By doing so, substrate and film defect densities would be reduced. Examiner interprets "low DC bias" as to mean include voltages that are below the glow discharge starting voltage. This meets the limitations of claims 1 and 2.

Art Unit: 1762

As to claim 16, Miyoshi teaches that the catalyzer is heated to 1300 – 1500 degrees Celsius and the substrate is heated to 300 – 400 degrees Celsius (column 4, lines 18-25).

As to claims 17 and 20, Miyoshi fails to teach that the catalyzer is heated by its own resistance heating, but does teach that the catalyzer is tungsten (column 4, line 24). Since resistance heating is a well-known method of heating tungsten to a high temperature (such as filaments in light bulbs), to heat the tungsten by resistance heating would have been obvious at the time the invention was made to a person having ordinary skill in the art with a reasonable expectation of success. By doing so, the apparatus used in the process is made simpler.

Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyoshi (US 6,225,241 B1) in view of Foster et al. (US 4,668,365) as applied to claim 1 above, and further in view of Tseng et al. (US 6,291,343 B1).

Miyoshi and Foster, collectively, teach the limitations of claim 1, but are silent to where the electrode is located. However, Tseng teaches a process for causing ion-bombardment to a substrate in which a film is to be deposited on. In order to control (accelerate) the ions for the longest period of time, the showerhead that introduces the gases is also the electrode supplying the DC bias (column 6, lines 36-51). It would have been obvious at the time the invention was made to a person having ordinary skill in the art to have the gas inlet of the process taught by Miyoshi and Foster also be the electrode supplying the DC bias. As the catalyzer of Miyoshi, which produces the ions,

Art Unit: 1762

is located in the chamber, having the electrode also be the gas inlet port would result in the same benefit of accelerating the ions for the longest possible amount of time. The longer the ions are accelerated, the less voltage is needed in order to achieve the same bombardment speed. This arrangement of having the electrode also be the gas inlet port and having the catalyzer placed in the chamber gives the arrangement claimed by the applicant in claims 8 and 9.

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miyoshi (US 6,225,241 B1) in view of Foster et al. (US 4,668,365) as applied to claim 1 above, and further in view of .Doi (US 5,900,161).

Miyoshi and Foster teach the limitations of claim 1, but fail to teach process of cleaning the deposition chamber after the coated substrate has been taken out. However, Doi teaches a plasma, self-cleaning technique where fluorine radicals are produced by an electric-discharge plasma. This process eliminates silicone-containing compounds that get deposited on the inner walls of the chamber (column 1, lines 45-51). It would have been obvious at the time the invention was made to a person having ordinary skill in the art to remove the SiN-coated substrate of Miyoshi from the deposition chamber and then generate a plasma discharge by the electrodes that are all ready present in the chamber. By adding a fluorine gas to the chamber, the insides of the chamber are cleaned from the silicone-containing compounds.

Art Unit: 1762

Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miyoshi (US 6,225,241 B1) in view of Foster et al. (US 4,668,365) as applied to claim 1 above, and further in view of Schrank (US 3,769,670).

Miyoshi and Foster teach the limitations of claim 1, but fails to teach that the catalyzer being heated in a hydrogen-based atmosphere before supplying the material gas. However, Schrank teaches that because tungsten readily oxidizes when heated, it is necessary to use reducing atmospheres, such as hydrogen, when heating (column 1, lines 15-20). This reference further teaches that hydrogen bromide is preferred as the atmosphere gas when heating tungsten to temperatures of about 1500 degrees Celsius (column 1, lines 35-42). It would have been obvious at the time the invention was made to a person having ordinary skill in the art to heat the tungsten catalyzer of Miyoshi in a hydrogen bromide atmosphere prior to introducing the material gases. By doing so, oxidation of the catalyzer would be reduced or prevented. Examiner interprets hydrogen bromide gas to be a hydrogen-based gas.

Response to Arguments

Applicant argues that there is no teaching that Foster is suitable for performing the process of Miyoshi and that Foster does not comprise a catalyzer, thus proper motivation to combine the two teachings is absent. This is not found persuasive. The examiner has relied on Foster as providing motivation to add an additional obvious feature to the process of Miyoshi, with the expectation of achieving benefits. The reference is not relied upon as being a substitute method for performing the process of

Art Unit: 1762

Miyoshi, which the applicant has seemed to argue. Foster is used for it's teaching that it is well known that biasing causes ion bombardment, which ultimately results in less defects in coating process. Regardless of the presence of a catalyst or the capability to perform the process taught by Miyoshi, one of ordinary skill in the art would recognize the benefits of having ion bombardment in Miyoshi such that defects are reduced. Foster teaches that this would be possible by using a DC bias ion the presence of ions. One of ordinary skill would recognize that the catalyzer in Miyoshi produces ions. Therefore, motivation exists to use a DC biasing in the process of Miyoshi in order to reduce defects.

Applicant argues that Foster fails to teach that the DC bias is below the glow discharge starting voltage. This is not found persuasive. It is the position of the examiner that by "low DC voltage", the range that this includes to one of ordinary skill in the art would at least include voltages that are below the glow discharge. Additionally, it is noted that as the voltage is a "biasing" voltage. One of ordinary skill would interpret this as meaning the voltage is less than the glow discharge starting voltage. If the voltage were above the glow discharge starting voltage, it would have been conventionally called a "discharge" or "ignition" voltage.

Applicant argues that hindsight reasoning is used when the examiner makes use of the applicant's specification to show that silane passing a catalyzer produces ions. This not found persuasive. In response, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of

Art Unit: 1762

ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). The examiner only uses the applicant's specification for showing proof that the phenomenon of ions being produced is all ready well known in the art to happen. This teaching in the specification was taught as background art and in doing so proved that this phenomenon was all ready known to those of ordinary skill in the art. Knowledge gleaned only from the applicant's disclosure was not used in the reconstruction of the rejection. Therefore the reconstruction is proper.

Applicant argues that the combination of Foster and Miyoshi only provides an "obvious-to-try" situation, as further investigation would be required to obtain the claimed result. This is not found persuasive. Foster teaches that ion bombardment is possible by having a DC voltage and ions present and results in fewer defects in coating processes. The ions of Miyoshi are known by those in the art to be present. Therefore, to use biasing in Miyoshi would have been obvious with the expectation of achieving fewer defects. Any further "investigation" required by one of ordinary skill would have been routine experimentation, such as optimization.

Applicant argues that Teng, Doi, and Schrank, all fail to teach that their disclosed methods are suitable for performing the method of Miyoshi. None of the three references comprise teach a catalyzer. This is not found persuasive. The examiner has relied on these three references as providing motivation to add additional obvious features to the process of Miyoshi, with the expectation of achieving benefits. The

Art Unit: 1762

references are not relied upon as being substitute methods for performing the process of Miyoshi, which the applicant has seemed to argue. Teng teaches that to have the showerhead be an electrode, better control is provided for ion bombardment processes. To use this feature in the process of Miyoshi, with the obvious modifications of ion bombardment taught by Foster, would have been obvious. Doi teaches a self-cleaning process that would have been obvious to incorporate into the coating process taught above. Schrank teaches to use reducing gases when heating tungsten because tungsten readily oxidizes. Since Miyoshi requires heating of tungsten, it would have been obvious to use a reducing gas, as taught by Schrank, in order to prevent the tungsten from oxidizing.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Art Unit: 1762

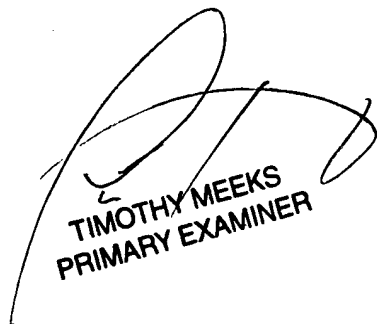
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric B Fuller whose telephone number is (703) 308-6544. The examiner can normally be reached on Mondays through Thursdays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck, can be reached at (703) 308-2333. The fax phone numbers for the organization where this application or proceeding is assigned are 703 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.



EBF
October 21, 2002



TIMOTHY MEEKS
PRIMARY EXAMINER